PLEASE Leave this card with owner or operator of the installation.

OPERATING AND MAINTENANCE INSTRUCTIONS
FOR
AMARILLO
RIGHT ANGLE GEAR DRIVES

INSTALLATION

All units for domestic shipment by surface transportation are shipped with the proper amount and type of lubricant installed. Export or air freight shipments are shipped with initial oil fill in separate containers.

Install oil to the required level or add oil if spillage has occurred.

Inspect and clean top of pump discharge base and bottom of gear drive to assure removal of burrs or foreign material that might cause misalignment.

Install gear drive on discharge base and slide non-reverse clutch over headshaft. The non-reverse clutch should fit on the headshaft and engage the drive sleeve or drive nut **without springing** the headshaft. Lubricate the headshaft threads and bottom of the adjusting nut before raising the pump impellers.

Remove rust preventive from shaft extension and clean thoroughly. Install coupling half or flange. Hammering or mechanically forcing the coupling on the shaft can damage the bearings or disturb the setting of the gears and is not permissible. Interference fits are permissible if the coupling can be heated for installation and fitted without hammering or mechanically forcing on the gear drive shaft. Check runout of aligning surfaces on both coupling halves before installing connecting members.

When a flexible drive shaft is to be used, see installation instructions on the following page.

Align driver with gear drive to obtain parallel and angular alignment within limits specified by coupling or drive shaft manufacturer. Incorrect alignment will void the warranty on the Amarillo Right Angle Gear Drive.

Excessive noise and vibration in a new gear drive is almost always an indication of a poor installation as all drives are tested at the factory. Failure to correct the installation can result in damage to the pump and gear drive. Our warranty will not apply unless the drive is properly installed. Proper installation includes alignment of power unit, right angle drive and pump. It is also necessary to provide an adequate foundation for the pump and engine and a positive method of preventing the power unit from shifting to assure that alignment will be maintained.

LUBRICATION

Use only rust and oxidation inhibited (R & O) gear oils in accordance with Amarillo Gear Manufacturers' Association (AGMA) Standard 250.03 dated May, 1972. For general operating conditions, AGMA lubricant number and corresponding viscosity range should be as shown below. Contact factory for specific lubricant recommendations for operation under extremely hot or cold ambient conditions.

Gear drives operating in very cold weather must be provided with an oil that has a viscosity which is low enough to allow the oil to flow through the lubrication lines. An oil flow test valve may be installed by replacing the pipe plug located to the rear of the name plate with a suitable valve. Be sure to provide some method of preventing the valve from vibrating open during the operation of the drive. Oil must flow through this valve immediately upon start up, otherwise, the bearings and gears will not be properly lubricated. For consistent cold weather starting, a lube oil heater may be required. Contact factory for recommendations for lube oil heaters if needed.

AMARILLO GEAR COMPANY
A DIVISION OF THE MARMON GROUP, INC., (MICHIGAN)

Post Office Box 1789
Amarillo, Texas 79105
806/373-7491 Cable: Amadrive

TABLE 1 AGMA LUBRICANT NUMBER

MODEL NUMBER	AMBIENT TEMPERATURE	
	15° to 60° F. (—9° to 16° C)	50° to 125° F. (10° to 52° C)
20 Through 200	2	3 - 4
*275 Through 1200	4	5

*Lubricant for models 275 and larger should be selected to have a viscosity of 150 SSU at the operating temperature. To determine the operating oil temperature, measure the oil sump temperature with a thermometer after the drive has been operating for four hours or longer. AGMA lubricant number 5 is adequate for an operating temperature range of 160° to 180° F. (71° to 82° C).

TABLE 2 TYPICAL LUBRICANTS

AGMA LUBRICANT NUMBER	2	3	4	5
Viscosity Range, SSU at 100° F. cSt at 37.8° C	284-347 62-75	417-510 90-110	626-765 135-165	918-1122 198-242
Amalie	Gearhead Oil #300	Gearhead Oil #500	....	....
Atlantic Richfield Company	Duro S-315LP	Duro S-465	Duro S-700	Duro S-1000
Chevron Oil Company	OC Turbine Oil 15	OC Turbine Oil 19	OC Turbine Oil 24	OC Turbine Oil 36
Cities Services Oil Company	Pacemaker 30	Pacemaker 60	Pacemaker 80	....
Continental Oil Company	Dectol 33 R&O	Dectol 51 R&O	Dectol 76 R&O	Dectol 92 R&O
Exxon Company	Teresstic 52	Teresstic 65	Teresstic 85	Nuto 93
Gulf Oil Corporation	Harmony 53	Harmony 61	Harmony 75	Harmony 88
Mobil Oil Company	DTE Oil Heavy Medium	DTE Oil Heavy	DTE Oil Extra Heavy	DTE Oil BB
Phillips Petroleum Company	Magnus 315	Magnus 465	Magnus 700	Magnus 1000
Shell Oil Company	Turbo 33	Turbo 41	Turbo 69	Tellus 71
Sun Oil Company	Sunvis 754	Sunvis 764	Sunvis 775	Sunvis 790
Texaco Inc.	Regal PC R&O	Regal PE R&O	Regal F R&O	Regal G R&O

List of brand names is for purpose of identifying types and is not to be construed as exclusive.

CHANGE INTERVAL

Change oil at least every 1000 to 1500 hours of operation. If drive is operated intermittently less than 1000 hours in a season run of two or three months, change oil at the end of that period of operation to eliminate water formed in the gear case due to condensation. Frequency of change will depend upon the rate of water condensation in the drive. Drives operated in climates with hot days and cool nights will accumulate moisture more rapidly than drives operated at constant temperatures. More frequent oil changes are necessary for units which operate with an oil tempeature above 180° F, (82° C). The oil should be changed after every 500 to 700 operating hours under these conditions. Contact factory for special lubrication procedures when the operating oil temperature exceeds 200° F. (93° C).

To drain the oil, remove the drain plug in the base flange. Refill at filler plug, which is located directly below name plate. If the drive is equipped with sight gauge, fill to level indicated. If the drive does not have a sight gauge, the oil level is one half inch below the top of the filler hole.

TABLE 3 OIL CAPACITY

MODEL		LITERS
20	1½ Quarts	1½
40	4 Quarts	4
60, 80, 100	9 Quarts	8½
125	9 Quarts	8½
150, 200	4 Gallons	15
275, 375, 450	11 Gallons	42
600	12 Gallons	45
750	17 Gallons	64
1200	18 Gallons	72

Older drives with water jackets will require less oil.

COOLING

Amarillo Gear Drive Models, 100, 125, 150, 200, 275, 375, 450, 600 and 750 are assembled with cooling coils as standard equipment. Model 1200 is assembled with an external shell and tube heat exchanger. Cooling coils are available on special order in model 40, 60 and 80. The oil is cooled by circulating water through the coils or the tube side of the heat exchanger. Cooling water is piped from a service connection on the discharge head of the pump to the lower cooling water connection on the gear drive. The upper connection is then piped to a spillway or back into the well casing. If there is not sufficient pressure, the water can be started by siphoning through the drive.

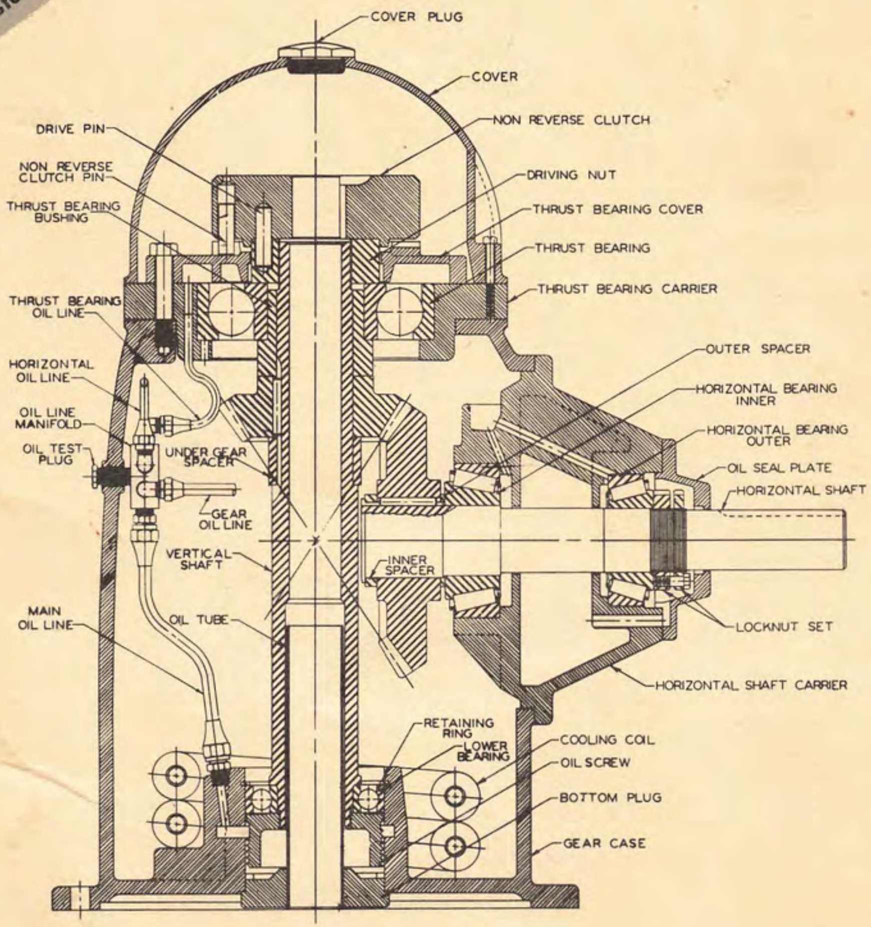
The operating temperature of the drive will depend on many factors. Water cooling should always be used if the operating oil temperature exceeds 180° F. (82° C.) and the drive is to be operated for periods greater than eight hours per day. Water cooling will usually be required on model 100 and larger drives. Smaller drives may require water cooling if speeds are over 1760 rpm or if they are exposed to high room temperatures, limited air circulation, direct rays of the sun or other external sources of heat.

Table 4 is the coolant flow required when fresh water at 70° F. (21° C) is used and other operating conditions are normal.

TABLE 4

MODEL	GALLONS PER MINUTE	LITERS PER MINUTE	MODEL	GALLONS PER MINUTE	LITERS PER MINUTE
40	1	3	275	4	15
60	1	3	375	5½	21
80	1	4	450	6½	25
100	1½	6	600	9½	36
125	2	8	750	11	42
150	2½	9	1200	12	45
200	3	11			

PLEASE
Leave this card
with owner or operator
of the installation.



Manufactured by

AMARILLO GEAR COMPANY

AMARILLO, TEXAS

Keep This Card

Form 101D—12-75

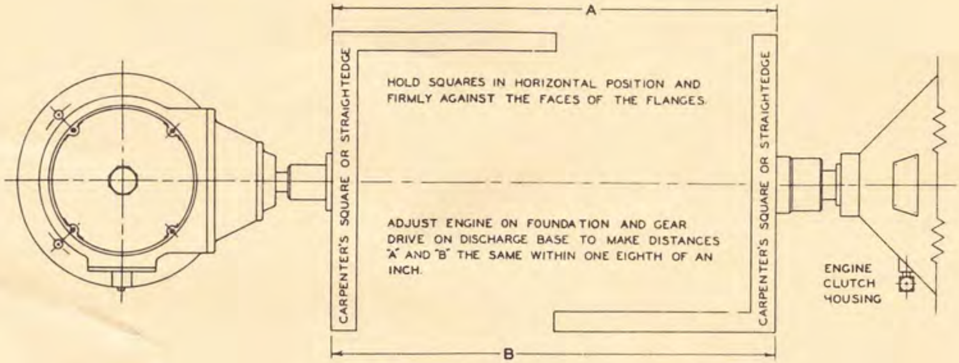
NON-REVERSE CLUTCH INSTRUCTIONS

The four enclosed pins are for the non-reverse clutch. They are to be placed in the drilled holes in the clutch if non-reverse protection is desired, or they can be left out if non-reverse protection is not needed. Pins and holes must be clean and free of oil so that the pins will fall freely.

The non-reverse protection is not guaranteed. Settings of over 400 feet (122 meters) deep will require special procedures and in some cases the pin and ratchet type non-reverse will not work. Consult supplier for the proper procedure to follow in shutting down the well.

The gear drive may be damaged by accidental shock engagement of the non-reverse. This can be caused by the engine backfiring with the clutch engaged or by the pump starting to backspin before the pins engage the ratchet. Check the gear drive carefully after any shock engagement of the non-reverse. On some models the driving nut could unscrew from the hollow shaft. If this happens the nut must be tightened before resuming operations.

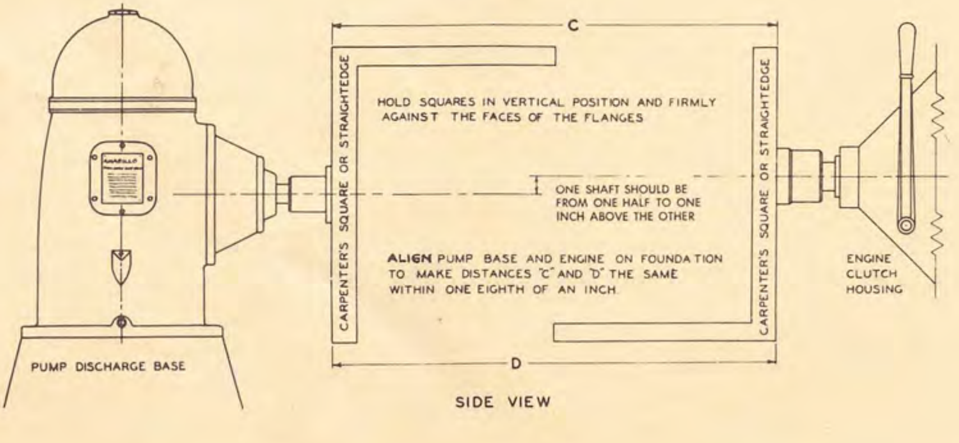
FLEXIBLE DRIVE SHAFT INSTALLATION INSTRUCTIONS


A
CARPENTER'S SQUARE OR STRAIGHTEDGE
CARPENTER'S SQUARE OR STRAIGHTEDGE
ENGINE CLUTCH HOUSING
B

HOLD SQUARES IN HORIZONTAL POSITION AND FIRMLY AGAINST THE FACES OF THE FLANGES.

ADJUST ENGINE ON FOUNDATION AND GEAR DRIVE ON DISCHARGE BASE TO MAKE DISTANCES "A" AND "B" THE SAME WITHIN ONE EIGHTH OF AN INCH.

TOP VIEW


C
CARPENTER'S SQUARE OR STRAIGHTEDGE
CARPENTER'S SQUARE OR STRAIGHTEDGE
ENGINE CLUTCH HOUSING
PUMP DISCHARGE BASE
D

HOLD SQUARES IN VERTICAL POSITION AND FIRMLY AGAINST THE FACES OF THE FLANGES

ONE SHAFT SHOULD BE FROM ONE HALF TO ONE INCH ABOVE THE OTHER

ALIGN PUMP BASE AND ENGINE ON FOUNDATION TO MAKE DISTANCES "C" AND "D" THE SAME WITHIN ONE EIGHTH OF AN INCH.

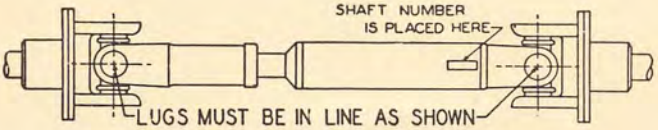
SIDE VIEW

Check the universal joints to see that they work freely before installing the drive shaft. The drive shaft should fit into the recess machined in the flange face without using the bolts to force it in. Never use a flange that has been damaged by direct hammering on its face.

The engine and gear drive shaft need not line up axially but they must be parallel within one degree. A simple positive method of checking alignment before installing the drive shaft is illustrated above. Two carpenter's squares or straight edges of equal length and a steel tape will be the only equipment required.

Lubricate the drive shaft before using and then every 200 to 500 hours with 140 SAE straight mineral oil or low solid content grease. Use the following lubricants or equal:

Journal Crosses:	Oil - Texaco PASR-629 Grease - Shell Alvania EP #2
Sliding Splines:	Texaco Marfac E.P. #1



When installing flexible shafts, be sure that joints are assembled with lugs in the same plane as shown. If lugs are not as shown, unequal acceleration occurs in the joints and vibration and knocking develop. Allow for slip movement in each direction.

WARRANTY

The Amarillo Right Angle Gear Drive is guaranteed against defects in workmanship and material for a period of one year after installation when operated under normal service at rated capacity. Within the above stated period the manufacturer will replace defective parts, returned transportation prepaid. The guarantee will not apply to repairs made outside the factory without the consent of the manufacturer, or to drives that have been subject to abuse, accident, neglect, or improper installation. No warranty is made in regard to bearings, trade accessories, machinery, or other articles of merchandise not manufactured by us. No responsibility will be assumed for overloading the rated capacity of the thrust bearing. (The thrust capacity of the drives should be verified by the pump manufacturer with whose equipment the drive is used.) This warranty is expressly made in lieu of any warranties otherwise implied by law.